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Critical remarks on the southern Italian asellids described by E. DUDICH (1925) with redescriptions of some taxa (Crustacea, Isopoda, Asellota)

By

F. STOCH

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ABSTRACT. A small collection of asellids studied by DUDICH (Budapest) in 1925 and deposited in the Hungarian Natural History Museum has been re-examined; four taxa have been determined: Proasellus banyulensis italicus comb. n., Proasellus banyulensis polychaetus comb. n., Proasellus wolfi comb. n. and Asellus aquaticus (L.) sensu Racovitza, 1919 (both nominal form and ssp. arthrobranchialis). The material of P. b. italicus and P. b. polychaetus has been redescribed; a critical survey of all the epigean taxa already described from Italy is also given.

KEY WORDS: Isopoda, Proasellus spp., redescription, Italy

Since the works of DUDICH (1925, 1925a), the taxonomy and distribution of epigean freshwater asellids from Italy has received little attention (ARCANGELI 1942; STOCH 1985). Up to now three species have been known: Asellus aquaticus (L.) sensu Racovitza, 1919 (both nominal form and ssp. arthrobranchialis Dudich, 1925); Proasellus istrianus (Stammer, 1932) (recently redescribed by STOCH, 1985); Proasellus coxalis (Dollfus, 1932), with several subspecies (italicus Dudich, 1925; polychaetus Dudich, 1925, wolfi Dudich, 1925, dudichi Strouhal, 1937, sardous Arcangeli, 1942 !nomen nodum!, tergestinus Stoch, 1985).

Except for P. istrianus, a well distinguished species which belongs to the P. meridianus-group, the taxonomy of the Italian populations attributed to the other two taxa is still in a chaotic state. In fact the authors interested in the determination of material from Italy (STAMMER 1932; STROUHAL 1937; ARCANGELI 1942; PESCE and TETE 1976, 1978; STOCH 1985) confined themselves to the uncritical description of the newly collected specimens, and based their diagnosis on the poor illustrations given by RACOVITZA (1919, 1919a) and DUDICH (1925, 1925a).

A recent revision of the P. coxalis-group (STOCH in press) demonstrated that several species are hidden under the name "coxalis", and that P. coxalis s. str. is not present in Europe. Unfortunately, the diagnostic characters of the different taxa were rarely taken into consideration by previous authors. Consequently there was a need of a detailed reexamination of the type material of all the taxa previously described and particularly of those described by DUDICH in 1925, following the new taxonomic criteria pointed out in my previous paper (STOCH, 1985). This is why I have studied almost all the existing material of Proasellus described from Italy by DUDICH (1925, 1925a), STAMMER (1932), STROUHAL (1937) and ARCANGELI (1942), and I have fixed lectotypes of all the taxa which have kept their taxonomic value.

The first results of these studies were published in STOCH (in press), STOCH et al. (in press). This paper deals with the material of DUDICH's collection and the taxa distribut-

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*Contribution to the knowledge of the Isopods: XI.

ed in southern Italy. In the descriptive part of this work the essential synonymy (referred to only those papers in which systematic consideration on Italian taxa are given) and the material examined is listed. A redescription of the most important taxa or a short diagnosis, as well as some taxonomic remarks, are also given.

DESCRIPTIVE PART

Asellus aquaticus aquaticus (L.) sensu Racovitza, 1919

Material examined: Lago Maggiore (northern Italy), leg. COLLIN, 2 males (HNHM 1626, determined by DUDICH as Asellus arthrobranchialis).

Asellus aquaticus arthrobranchialis Dudich, 1925

Essential synonymy: Asellus arthrobranchialis Dudich, 1925a: 281; A. aquaticus arthrobranchialis: ARCANGELI 1942: p. 177; KARAMAN 1952: p. 68; SKET 1965: p. 185; A. (s. str.) aquaticus: BIRSTEIN 1964: p. 54.

Material examined: Sarno river, spring (original label: Sarno, sötét forrás), leg. E. DUDICH, 23. III. 1925, 10 males (HNHM 1630), 18 females (HNHM 1627), both labelled as type material (syntypes); Sarno river and its inflows (original label: Sarno, a Sarno és mellékvizeiben, cotypi), leg. E. DUDICH, 23. III. 1925, 6 specimens (HNHM 1629); Caserta, leg. E. DUDICH, 5. IX. 1925, 2 females and 1 damaged specimen (HNHM 1628). Sarno river, leg. KESSELYÁK, 28. V. 1930, 1 male (HNHM 1651).

Type material: the specimens with the label "Typi" and "Cotypi" from Sarno river have to be considered as syntypes. Considering that the validity of this subspecies is still doubtful, and could be confirmed only with further researches on the populations from central and southern Italy. I have not fixed the lectotype. The type-material is deposited in the collections of the Zoological Department of the Hungarian Natural History Museum in Budapest.

Diagnosis: Asellus aquaticus arthrobranchialis differs from type form in the small size of respiratory area on exopods of pleopods IV and V (see DUDICH, 1925a; Figs 3-6). The description given by DUDICH (1925) is good.

Remarks: A. aquaticus is a widely distributed species; its morphological variability and the enormous amount of material which should be re-examined for a complete revision of all its subspecies prevented me from presenting a correct interpretation of the Italian taxa in this paper.

The most important question concerns the taxonomic position of ssp. arthrobranchialis (Dudich, 1925). Although the discriminating character used by DUDICH (presence of linea articularis in exopod of pleopods IV and V) cannot be considered as diagnostic (being common to A. aquaticus: KARAMAN, 1952), the size of respiratory area of the same appendages indicates that the population from Sarno River and the type form are, distinct (see KARAMAN 1952, 1952a). However, the degree of variation of this character important in the diagnosis of the taxa from Southeastern Europe (SKET 1965) - in the Italian populations is unknown. That is why I consider here arthrobranchialis as a doubtful, endemic subspecies of A. aquaticus.

Several authors followed DUDICH in considering ssp. arthrobranchialis as a good species, and attributed some other European populations to this taxon. Obviously these diagnoses were wrong (see SKET 1965). Limiting the examples to Italy and neighbouring localities, I have observed that the specimens from Lake Maggiore (SCHMÖLZER 1955) are closely related to the other populations from Northern Italy, well described by MORREALE (1924). I have examined several samples of them deposited in the collection of ARCANGELI. They belong to the type-form. A. aquaticus arthrobranchialis f. balcanica Karaman, 1952 is probably a group of populations, which (following the opinion of SKET (1965) should be attributed partly to the type form and partly to a distinct subspecies (ssp. balcanicus) (see also SKET 1965). A. aquaticus arthrobranchialis f. cresana Karaman, 1952 does not belong to this subspecies (SKET 1965, considered it as synonymous with the type form).

Proasellus banyulensis italicus (Dudich, 1925) comb. n.

Essential synonymy: Asellus aquaticus: COSTA 1883: p. 82; ARCANGELI 1913: p. 482 (partim); A. banyulensis: MORREALE 1924: p. 133; A. italicus: DUDICH 1925: p. 3; STAMMER 1932: p. 125; A. (Proasellus) polychaetus polychaetus: STROUHAL 1937: p. 65; A. (Proasellus) coxalis banyulensis: ARCANGELI 1942: p. 185 (partim); A. (Proasellus) coxalis italicus: ARCANGELI 1942: p. 185; ARCANGELI 1960: p. 6; A. (Proasellus) coxalis polychaetus: ARCANGELI 1942: p. 186 (partim); A. (Proasellus) coxalis sardous: (nomen nudum) ARCANGELI 1942: p. 187; (?) A. coxalis banyulensis: MARGALEF 1954: p. 150; A. (Proasellus) italicus: BIRSTEIN 1964: p. 102.

Material examined: Napoli, fountain of the Villa Nazionale (original label: Villa Nazionale szökökutjai), leg. E. DUDICH: 3. II. 1925, 26 specimens (HNHM 1645, type material); 9. VIII. 1925, about 250 spec. (HNHM 1687). Comparison material: Sala Consilina (Campania, Southern Italy), leg. E. DEGNER, IV. 1925, det. H. STROUHAL as A. (Proasellus) polychaetus polychaetus, 1937, 29 specimens (coll. Zool. Mus. Hamburg, K-20562). Sassari (Sardinia, Italy), leg. BENAZZI, 1936, labelled Asellus sp. (material determined by ARCANGELI, 1942, as A. (Proasellus) coxalis sardous) (coll. Mus. Zool. Anat. Comp. Torino, Is-318). Gargano (Puglia, Southern Italy), leg. POMINI, 1940, labelled A. coxalis garganicus Arc. (name never published; the material is cited in ARCANGELI, 1942, pag. 182, sub A. coxalis italicus) (coll. Mus. Zool. Anat. Comp. Torino, Is-314). River Tevere (Lazio, Italy), leg. F. VALENTINO and E. VOLPI, 8.9.1988. several specimens (author's collection).

Type material: Lectotype, one male from the fountain "Giovanni Nola", Villa Nazionale (Napoli, Campania region, Southern Italy), leg. E. DUDICH, 3. II. 1925, preserved in 75% alcohol), pleopods partially dissected and mounted on a slide in Faure medium; paralectotypes, 25 specimens, same locality and same date, preserved in 75% alcohol.

Description (type material from Villa Nazionale, Napoli): the following description supplements that of DUDICH (1925).

Eyes normally developed, pigment brownish; body length of lectotype 6.2 mm; maximal length of both sexes 9.0 mm; maximal width at the level of third pereionite; pleotelson approximately as wide as long. Antennulae, antennae, mouth parts and pereiopods as in type form, and well described in DUDICH (1925). An important feature can be observed in the inner lobe of maxillula: sometimes it bears 6 plumose setae instead of 5, this number is typical of the genus Proasellus (in a male the left lobe bears 5, the right 6 setae).

Pleopod I of lectotype (Fig. 1a) with protopod armed with 8 long spines and an inner retinaculum. The number of spines varies in other populations (Fig. 1 f, g). The exopod is 2.15 times as long as wide and has a variable number of outer spines and distal plumose setae (see Fig. 1); surface bearing 1-2 short spines (1 in lectotype) near inner proximal angle (which is slightly sharped), and a row of thinner setae parallel to inner margin (as Fig. 1 of DUDICH 1925, clearly shows). However, the number of setae is variable (5 in the lectotype, 8 following DUDICH), and in some populations the row itself is absent (Fig. 1g in the specimens from Tevere).

Pleopod II of male (Fig. 1b) with sympodite bearing 5-6 inner plumose setae; ratio between exopod and endopod approximately 1.65; exopod slightly sharped; structure of distal part of endopod (observed with a scanning electronic microscope: Fig. 1c) as in type form, with a long tergal apophysis and the lips of the goulot forming a narrow split ("fente sternal" of RACOVITZA 1919a).

Pleopod II of female as in the description and figure of DUDICH (1925).

Pleopod III as in type form, without any important feature.

Pleopod IV exopod (Fig. 1 d) approximately 1.5 times as long as wide, with elongated area, similar to the one of Proasellus coxalis; linea transversalis well defined, linea conjungens well distinguishable near outer margin. Proximal part of outer margin with 4 setae.

Pleopod V exopod (Fig. 1 e) 1.5-1.6 times as long as wide; distal margin slightly sharp, less rounded than in the other subspecies; linea articularis well defined. Shape of linea duplex characteristic of Proasellus banyulensis; ratio between parameters y1 and y2 (see STOCH in press) varies between 1.9 and 2.9; central part of this line very close to linea articularis.

Uropods slightly shorter than pleotelson; exopod and endopod subequal in length.

Variability: The spinulation of pleopod I in males is variable (see Fig. 1a, f, g and the figures published by ARCANGELI 1942); the ratio between exopod and endopod of pleopod II in males varies between 1.33 and 1.65; the number of segments of flagellum of A 1 is highly variable in both sexes.

Distribution: The distribution of the taxon in Italy includes almost the whole peninsular Italy (but it is localized), Sardinia and Sicily (where other similar species also occur): Asellus gardinii Arcangeli, 1942 is a probable synonym; the relationships between populations of Proasellus banyulensis described as tergestinus (Stoch, 1985), lucifugus (Deeleman-Reinhold, 1965), septentrionalis (Herbst, 1956), peregrinus (Herbst, 1956), perarmatus (Remy, 1936), africanus (Monod, 1924), bougiensis (Braga, 1948) will be taken into consideration in another paper.

Remarks: Up to now the taxa described by DUDICH as Asellus italicus (Dudich, 1925), A. polychaetus, A. banyulensis wolfi and A. coxalis cyanophilus (the latter three in DUDICH 1925a) have caused uncertainty in the classification of other samples collected in Southern Italy (STROUHAL 1937; STAMMER 1932; ARCANGELI 1942). These taxa were too similar to the "variable" Proasellus coxalis (Dollfus, 1892; type locality: Lake Tiberias, Syrie) to be considered as independent species in the more recent works. In fact their taxonomic relationship with Proasellus coxalis, P. banyulensis (Racovitza, 1919; type locality: Banyuls-sur-Mer, France) and other known taxa of coxalis-group was so uncertain that ARCANGELI (1942), in his survey of Proasellus species, considered all the taxa mentioned above as subspecies of P. coxalis (except for A. c. cyanophilus which has been considered as synonymous with A. b. wolfi). Since the publication of the paper of ARCANGELI, almost every student of the genus Proasellus has stressed the "variability" of P. coxalis and its large distribution (almost circummediterranean, with an isolated area in central Europe: see HERHAUS 1977; STOCH 1985 and the references they cited).

I have revised most of the existing material attributed to P. coxalis, as well as a considerable number of newly collected samples; the results of this study (STOCH in press) show clearly that under the name P. coxalis several species are hidden which are well defined from a morphological point of view. This fact is confirmed by the results of other biological investigations using electrophoretical techniques as well as breeding experiments (VOLPI et al. in press; STOCH et al. in press). These studies resulted in a different interpretation of the systematic position of the taxa described by DUDICH, as well as in a different taxonomic value attributed to the characters used by the same author.

The ssp. italicus belongs to P. banyulensis since the shape of linea duplex on exopod of pleopod V is characteristic and differs from the one of P. coxalis (STOCH in press). P. banyulensis italicus differs from type form as well as from ssp. polychaetus in the shape of area on exopod of pleopod IV; this feature is considered to be useful for the diagnosis at a subspecific level within P. coxalis-group (STOCH in press; STOCH et al. in press). The spinulation and shape of exopod of pleopods I and II, considered by DUDICH as discriminant characters, are not useful for this purpose. In fact their variability is high, and depends on water salinity (ROUBAULT 1954) and the age of the specimens, too.

The populations examined by ARCANGELI from Central and Southern Italy as well as from Sardinia belong to this subspecies. Some samples collected in Sicily (STOCH et al. in press) must also be attributed to this taxon. The presence of morphologically very similar individuals of the same subspecies, in Sicily and Sardinia could be a result of passive transport (STOCH et al. in press; VOLPI et al. in press).

The sample examined by STAMMER (1932) from Calabria (Arvo Valley, deposited in the Zoological Museum in Berlin and labelled as A. italicus) does not belong to this subspecies, but to a new subspecies of P. banyulensis which I will describe in another paper. On the contrary the sample collected near Sala Consilina and determined by STROUHAL (1937) as A. polychaetus polychaetus belongs to this subspecies. The attribution of this material to the taxon polychaetus is unjustified, since the shape of exopod of pleopod IV in these specimens and in typical italicus is almost identical.

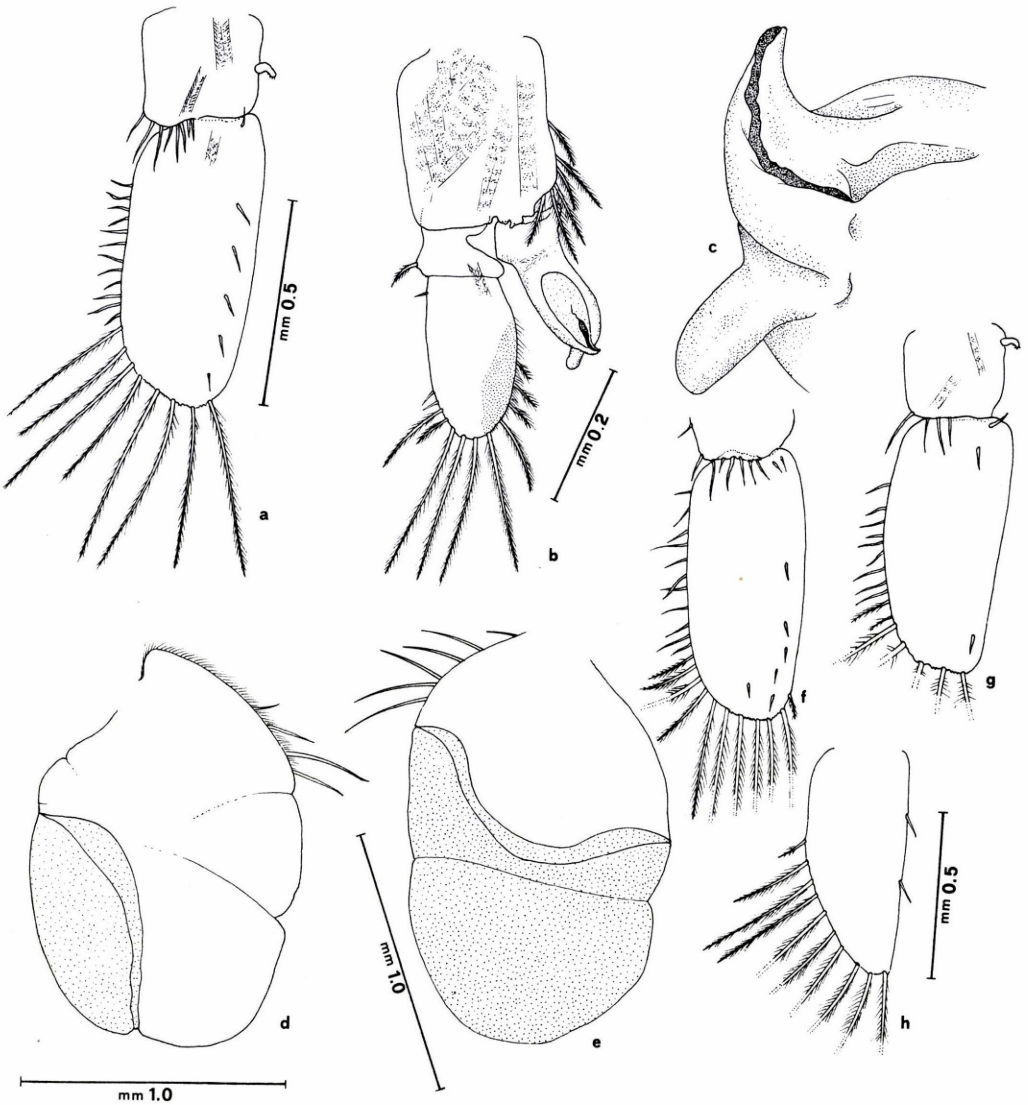

Fig. 1. Proasellus banyulensis italicus
Male (Villa Nazionale, Napoli): a) pleopod I; b) pleopod II; c) distal part of the endopod of the pleopod II; d) pleopod IV exopod; e) pleopod V exopod. - Male (Sala Consilina, Campania): f) pleopod I. - Male (Tevere river, Roma): g) pleopod I. - Female (Villa Nazionale, Napoli): h) pleopod II.

Proasellus banyulensis polychaetus (Dudich, 1925) comb. n.

Essential synonymy: Asellus polychaetus: Dudich, 1925a: p. 287; A. (Proasellus) coxalis polychaetus: Arcangeli, 1942: p. 186 (partim); Asellus (Proasellus) polychaetus: Birstein, 1965: p. 81.

Material examined: Sarno river, spring, Campania (original label "Sarno, sötét forrás"), leg. E. DUDICH, 23. III. 1925, 11 spec. (HNHM 1648, types); Sarno river and its inflows (original label "Sarno, a Sarno és mellékvizei"), leg. E. DUDICH, 23. III. 1925, 30 specimens (HNHM 1647, cotypes); Sarno river, IV. 1988, leg. F. VALENTINO, several specimens (author's collection).

Type material: Lectotype, one male from the spring of Sarno river (province of Caserta, Campania, Italy), leg. E. DUDICH, 23. III. 1925, preserved in 75% alcohol, pleopods partially dissected and mounted on a slide in Faure medium; the other specimens from the same river are the paralectotypes; the term cotype should be avoided (ICZN, 1985, recommendation 73e). The material is deposited in the Crustacea collection of the Hungarian Natural History Museum in Budapest.

Description: Eyes normally developed, colour brownish; length of lectotype 8. 5 mm.

I supplement here the description of DUDICH (1925a) concerning the pleopods.

Pleopod I of male (Fig. 2a) very similar to the one of P. banyulensis italicus; protopod armed with a distal row of 6-8 setae and 1 inner retinaculum; exopod approximately 2. 1 times as long as wide, with inner proximal angle sharped; the surface bears variable number of short spines; outer and distal margins bearing 12-15 spines and 6-9 plumose setae.

Pleopod II of male (Fig. 2b) with subquadrangular sympodite bearing 5 inner plumose setae; the mean ratio between exopod and endopod is 1. 46; exopod slightly sharped, bearing 9-12 distal plumose setae. Endopod as in ssp. italicus (distal part in Fig. 2c, studied by a scanning electronic microscope), with long tergal apophysis.

Pleopod II of female and pleopod III as in the description given by DUDICH (1925a), withouth diagnostic features.

Pleopod IV exopod (Fig. 2d) approximately 1. 4 times as long as wide, with linea conjungens and linea transversalis defined near outer margin. Area reduced in size, rounded, characteristic; proximal part of outer margin bearing 4-5 setae; 1-2 setae present on distal part of the same margin, near the incision formed by linea transversalis.

Pleopod V exopod (Fig. 2e) approximately 1. 6 times as long as wide, with distal margin rounded; linea articularis not clearly marked, linea duplex well defined. Ratio between parameters y1 and y2 approximately 2. 1; outer margin with 4-6 long setae.

Variability: The taxon is known only from Sarno river; the variability is limited to spinulation and the number of outer setae of pleopods.

Remarks: P. banyulensis polychaetus is well distinguished from ssp. italicus by the characteristic shape of exopod of pleopod IV and the small respiratory area; the difference is also remarkable from an electrophoretic point of view (NASCETTI, pers. comm.). The spinulation of pleopod I (from which the name polychaetus derives) is not a diagnostic character at the subspecific level (see Figs. 1 and 2).

STROUHAL (1937) described P. polychaetus dudichi from material collected in Calabria, near Cosenza. A reexamination of that material (deposited in the Zoological Museum of the University of Amburgo) showed that this taxon is very different from P. banyulensis polychaetus and also from ssp. italicus, and probably belongs to another, independent species.

Proasellus wolfi (Dudich, 1925) comb. n.

Essential synonymy: Asellus banyulensis wolfi: Dudich 1925a: p. 293; (?) A. coxalis cyanophilus: Dudich 1925a: p. 296; A. (Proasellus) coxalis wolfi: Arcangeli 1942: p. 186; A. (Proasellus) banyulensis wolfi: Birstein 1964: p. 105; (?) A. (Proasellus) coxalis cyanophilus: Birstein 1964: p. 109.

Material examined: Source of Ciane river (original label "Kyane folyó"), Siracusa, Sicily, leg. E. WOLF, 23. IV. 1925, 25 specimens (HNHM 1632, types); Source of Ciane river, leg. F. VALENTINO, IV. 1987, I. 1988, several specimens (author's collection); Anapo riv-

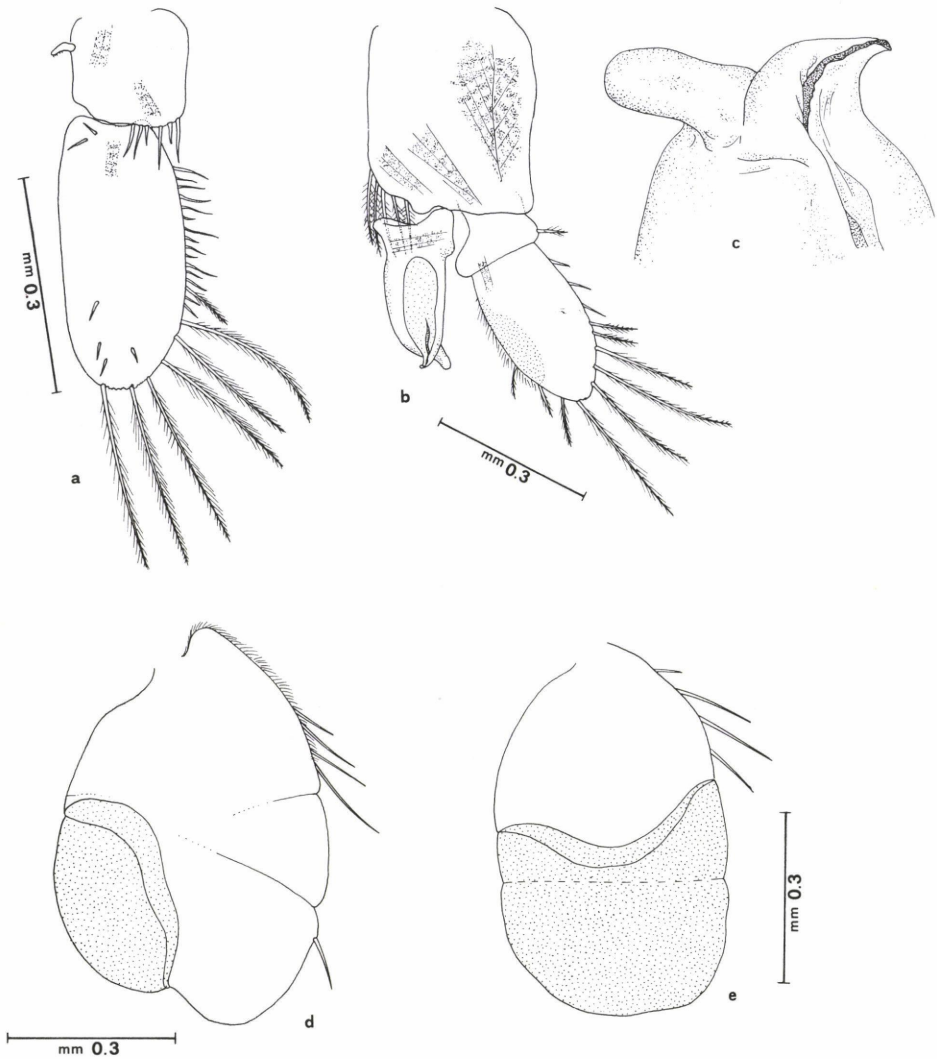

Fig. 2. Proasellus banyulensis polychaetus. Male (Sarno river, Campania)
a) pleopod I; b) pleopod II; c) distal part of the endopod of the pleopod II; d) pleopod IV exopod; e) pleopod V exopod

er, Siracusa, Sicily, leg. F. VALENTINO, IV. 1987, several specimens (author's collection); Anapo river, collector unknown, V. 1889, several specimens, det. HENRY and MAGNIEZ as P. coxalis wolfi (coll. DOLLFUS, Mus. Nat. Hist. Nat. Paris, Is. 2757).

Type material: Lectotype, one male (body length 6. 6 mm) from the source of Ciane river (province of Siracusa, Sicily, Italy), leg. E. WOLF, 23. IV. 1925, preserved in 75% alcohol, pleopods partially dissected and mounted on a slide in Faure medium; paralectotypes, 24 specimens from the same locality. The material is deposited in the Crustacea collection of the Hungarian Natural History Museum in Budapest.

Diagnosis: Species related to P. peyerimhoffi-group, with incisions formed by linea duplex on exopod of pleopod V approximately equidistant from linea articularis; shape of goulot of male characteristic, with distal part of sternal split wide and opened.

Remarks: P. wolfi is a good species, related to P. peyerimhoffi (Racovitza, 1919) from northern Africa more clearly than to P. banyulensis. Both the form of goulot and the shape of linea duplex differ from the ones of the taxa considered above.

Asellus coxalis cyanophilus was described by DUDICH (1925a) as co-occurring with P. wolfi: the diagnosis was based on the first two pairs of pleopods of a male only. The material (mounted on a slide) has not been found in the collections of the Hungarian Natural History Museum (FORRÓ, pers. comm.). Moreover the shape of the first pair of pleopods is insufficient to distinguish this species from P. wolfi. So I agree with ARCANGELI (1942) in considering the taxon cyanophilus as a probable synonym of P. wolfi.

P. wolfi is not redescribed in the present paper. It was taken into consideration in another work (STOCH et al. in press) dealing with all the epigean species of P. coxalis-group from Sicily (P. banyulensis italicus, P. montalentii Stoch et al. and its subspecies).

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Author's address: Dr. Fabio STOCH
Department of Biology, section Hydrobiology
University of Trieste
v. A. Valerio, 32
I-34127 Trieste
ITALY